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BULLETIN OF
THE GEORGIA ACADEMY OF SCIENCE

Volume XVI April, 1958 Numbers 1 & 2

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PROGRAM NUMBER

THIRTY-FIFTH ANNUAL MEETING
OF
THE GEORGIA ACADEMY OF SCIENCE
EMORY UNIVERSITY

Emory University, Georgia
April 25, 26, 1958

Local Arrangements Chairman – Romeo Martin
Emory University, Georgia
Georgia Junior Academy of Science Meeting and State Science Fair
University of Georgia, Athens – April 17-19, 1958

BRING THIS PROGRAM WITH YOU TO THE MEETING

W. B. Redmond, Editor

A. S. Furcron
W. H. Jones
Florene M. Young
Assistant Editors

THE BULLETIN of the GEORGIA ACADEMY OF SCIENCE is published four times each year, in January, April, June and September and is sent without charge to all members of the Academy.

Articles to be published in the Bulletin should be sent to the Editor, Box 534, Emory University, Georgia. Reprints of articles can be furnished when ordered before publication.

PROGRAM

FRIDAY, APRIL 25, 1958

Morning

8:00-12:00 Registration; Reservations for Annual Dinner. Lobby, Geology Building.

9:00-11:30 Section Meetings, Presentation of Papers.

11:30-12:00 Section Business Meetings.

12:00- 1:00 Luncheon. University Cafeteria or Elsewhere.

Afternoon

1:15- 2:15 General Business Meeting of the Academy. Remarks by the President. 206 Geology Building.

2:30- 4:30 Joint meeting of all sections to hear discussions of work of IGY as presented by representatives of the various branches of science. 206 Geology Building.

Evening

6:30 Annual Banquet. Alumni Memorial Building.

8:00 Address by Dr. Charles Lundquist of the Army Ballistic Missile Agency, Huntsville, Alabama, on the Army Satellite Program.

SATURDAY, APRIL 26, 1958

Morning

9:00 Chemistry Section, Undergraduate Student Program Jointly with the Georgia Section, American Chemical Society.

Science Education Section Field Trip.

Section I

BIOLOGY

Friday, April 25, 1958
308 Biology Building — 10:00 A.M.
R. B. Platt, Presiding
Papers to be Read

10:00 A.M. Fincher, E. L., W. B. Cown, and T. W. Kethley, Georgia Institute of Technology. "Characterization of Bacterial Genera, Species, and Variants by Infrared Analysis As Related to the Study of Airborne Bacteria."

10:15 A. M. Jackson, L. W. R., School of Forestry, University of Georgia, Athens, Georgia. "Anatomy of fusiform rust galls on Pinus taeda."

10:30 A. M. England, C. B. and H. F. Perkins, Agronomy Department, University of Georgia, Athens, Georgia. "Clay Mineralogy of Three Reddish-Brown Lateritic Soils."

10:45 A. M. Platt, Robert B., Emory University. "Recent opportunities in Georgia and the Southeast for radiation ecology."

Business Meeting

ABSTRACTS

Characterization of Bacterial Genera, Species, and Variants by Infrared Analysis As Related to the Study of Airborne Bacteria

E. L. FINCHER, W. B. COWN, and T. W. KETHLEY, State Engineering Experiment Station, Georgia Institute of Technology, Atlanta

Experiments were carried out to determine the applicability of infrared spectroscopy to the characterization of bacterial test cultures employed in the study of bacterial viability in the airborne state. A chromogenic variant isolated from strain ATCC 274 of *Serratia marcescens* has been used in this laboratory during the past few years as a standard test organism. While stability of this isolate is constant over a period of months, cultural changes occur which result in a significant decrease in aerial viability. Infrared spectroscopical methods were sought as a means of characterizing this change.

Quantitative techniques were applied in the use of the potassium bromide disc method and the incorporation of an internal standard in preparation of the whole cell bacterial cell sample for spectrographic analysis. In addition to the examination of the variants of *S. marcescens* ATCC 274, comparative studies were also made of bacterial genera and species.

3¼ x 4 slides

Anatomy of fusiform rust galls on Pinus taeda

L. W. R. JACKSON, School of Forestry, University of Georgia

Fusiform gall rust disease caused by *Cronartium fusiforme* is widespread on slash and loblolly pine in the South. Many investigators have reported on the life history of the rust fungus. This study was concerned with the anatomy of branch galls on loblolly pine.

The rust fungus can be distinguished from other fungi that infect pine by the large diameter of the intercellular hyphae and the formation

of haustoria. Diameter of hyphae in the wood rays varied from 3.0 to 4.3 mu with an average of 3.5 mu. They are septate and uninucleate. The intercellular hyphae follow the phloem rays through the cambium layer into the xylem and along the wood rays to a depth of 3 or 4 rings. Haustoria form as branches of the hyphae, becoming constricted to 1.0 mu in width as they pass through the cell walls, and then expand to normal size of hyphae. Haustoria are allantoid in shape, uninucleate, unbranched, 20 to 30 mu in length and usually extend toward the nucleus. They freely invade the cells of the cortex, phloem and wood rays, and the resin ducts.

Length of the uniseriate rays in healthy wood varied from 1 to 5 cells as compared to an average of 10 cells in the gall wood. Healthy wood had only 140 ray cells per mm. as compared to 550 in the gall wood. Radial length of ray cells increased from 73 mu in healthy wood to 103 in the gall.

2 x 2 slides

Clay mineralogy of three reddish-brown lateritic soils

C. B. ENGLAND and H. F. PERKINS, Department of Agronomy, College Experiment Station, University of Georgia

Mineralogical data of clays in three of the more important Reddish-Brown Lateritic soils of Georgia are reported. These soils include the Davidson series of the Piedmont Plateau Province, Greenville series of the Upper Coastal Plain Province and Decatur series of the Limestone Valley and Upland Province. Chemical analyses, interpretations of X-ray defraction patterns, and D.T.A. curves indicate kaolinite and vermiculite to be the predominant clay mineral types. Other minerals such as gibbsite, goethite, illite, quartz, and feldspars, and unidentified amorphous material constitute the remainder of the clay fractions.

2 x 2 slides

Section II

CHEMISTRY

105 Biology Building, 9:30 A.M.
Gene Roberts, Presiding

Chemistry of a Positive Oxidation State of Astatine

HENRY M. NEUMANN, SCHOOL OF CHEMISTRY, Georgia Institute of Technology[1]

The chemistry of the synthetic element astatine has been investigated by solvent distribution methods. Comparison with reaction of iodine suggests that the astatine is in the (I) state. Evidence suggests the existence of chloro-, bromo-, and iodo- complexes, but there is no evidence for a fluoro-complex. In solutions of low chloride cncentration the astatine is present as AtCl; in basic solution it is present as HAtO or ATO.– Distribution experiments involving H_2SO_4 and HNO_3 in the aqueous phase, and involving aromatic solvents as the second phase display certain anomalous features that will be discussed.

3¼ x 4 slides

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[1]Work performed at Argonne National Laboratory, Lemont, Illinois.

The Polarography of Metal-Thiosulfate Complexes

DONALD G. DAVIS, Chemistry Department, Georgia Institute of Technology

The polarography of various metal ions in thiosulfate media was investigated in order to establish analytical methods for such solutions and to determine the coordination numbers and the dissociation constants of the metal ion complexes.

There are several possible ways that thiosulfate ions may act as ligands. Either the sulfur, the oxygen or both may act as a donor. The strength and properties of any particular complex would presumably vary according to the method of complexing. Some information on this point is given by the fact that, when nickel and cadmium are electroplated from thiosulfate solutions, various amounts of metal sulfide are found in the plates. This does not happen when zinc or copper is plated.

The polarographic behaviour of nickel and cadmium indicates that strong thiosulfate complexes are formed. Cadmium behaves reversibly at the dropping mercury electrode and the characteristics of its thiosulfate complex have been determined. Nickel behaves irreversibly but nevertheless useful information about its complexes is reported.

The complexes of copper (I), lead, and zinc have also been investigated and dissociation constants determined. Connections between the structure of the complexes and polarographic characteristics are discussed.

3¼ x 4 slides

Selection of Liquid Stationary Phases for the Separation of Volatile Mixtures by Gas Chromatography

ANN R. STASCH, Georgia Experiment Station, Experiment, Ga.

This paper discusses the general rules which may be followed for the selection of a liquid stationary phase for the separation of the components of known volatile mixtures by gas chromatography. Complex organic mixtures which contain representatives of many different classes often cannot be separated by one column but must be passed through two or more, depending on the number of different types of compounds present. Four mixtures were prepared which contained some of the type compounds commonly occurring in natural products. These were tested with 21 different stationary liquids. A discussion of the results is given.

3¼ x 4 slides

The "Reductive Cyclization" of Indolyl Ethylisoquinolinium Salts

JOHN W. HUFFMAN, School of Chemistry, Georgia Institute of Technology

The reduction of β-(3-indolyl) ethylisoquinolinium bromide (I) to dehydroyohimbane (II) with lithium alumnium hydride has been investigated, and has been found to be in reality two separate reactions. The first is the reduction of the isoquinolinium salt to the 1,2-dihydroisoquinoline, which is found to undergo an extremely facile mineral acid catalysed cyclization to the dehydroyohimbane. The unstable dihydroisoquinoline intermediate has been isolated, and cyclized to the yohimbane. The structure of this intermediate was proven by its reduction with sodium borohydride to β-(3-indolyl) ethyltetrahydroisoquinoline. The tetrahydroisoquinoline was compared with a sample of the compound prepared by an independent synthesis.

It was found that reduction of β-(3-indoyl) ethylisoquinolinium bromide with sodium borohydride afforded the tetrahydroisoquinoline derivative as the sole product.

3¼ x 4 slides

The Mechanism of the Electrochemical Reduction of Phenyl Ketones to Alcohols

LEON MANDELL, ROBERT POWERS and R. A. DAY, JR., Department of Chemistry, Emory University

The mechanism of the electrochemical reduction of phenyl ketones to the corresponding alcohol was studied by carrying out the reaction on a ketone having an asymmetric center thereby introducing the possibility of producing diastereomeric products. It was found that only one of the two possible alcohols is produced. The implications of this on the mechanism of this process will be discussed.

3¼ x 4 slides

Polarography of Some Aliphatic Ketones

ROBERT M. POWERS and R. A. DAY, JR., Chemistry Department, Emory University

The polarographic reaction of a number of aliphatic ketones has been studied in solutions of tetraalkylammonium salts.

A number of macroelectrolyses have also been run at controlled potentials and the products identified. It was found that the secondary alcohol is often the principal product obtained by the reduction of such ketones although polarographic behavior indicates a one-electron reduction process. The unusual molecule, 2,2,4,4-tetraphenyl-3-oxetanone was reduced with apparent opening of the oxetane ring.

3¼ x 4 slides

11:30 A.M. Business Meeting

Saturday, April 26, 1958 — 9:00 A.M.

Undergraduate Student Program, Joint Meeting with the Georgia Section, American Chemical Society

J. M. DallaValle, Presiding

Since students have been given a longer time to prepare their papers, the program for this meeting will not be available before April 15, but will be distributed at the meeting. These papers will be presented in competition for the F. Homer Bell Awards of the Georgia Section of the American Chemical Society.

Section III

EARTH SCIENCES

Geology Building — 9:30 A.M.

W. H. Grant, Presiding

A Transitional Late Archaic-Early Woodland Site Near Statesboro, Georgia

A. R. KELLY, University of Georgia, and C. S. KNOWLTON, Georgia Teacher's College

The Mosely Farm site is located near Statesboro, Georgia, on minor drainage of the Ogeechee river. The materials for this study represent largely surface collections by the owner over a period of years. The collections come from a plowed field of 2-3 acres. Human occupation of this area, as indicated by study of surface collections, indicates successive and multiple occupation by several recognized groups in the cultural

chronology of northeast Georgia and the Savannah sub-region.

A good representative assortment of stone work, projectiles and cutting tools predominating, is reminiscent of the assemblage associated with the upper levels of the famous Stallings Island site, on the Savannah river below Augusta.

Also present are generous quantities of the earliest pottery found in the Southeast, a fibre-tempered ware, very thick and poorly fired, which at the Mosely Farm site exhibits a gradual change in tempering from fibre-tempered to coarse grit and sand tempered varieties.

Minority pottery represents a more recent occupation of the site after a long hiatus from the fibre-tempered settlement, marked by cord-marked, some check stamped varieties, and a thinner, smoother plain grit series. These latter are allocated to the Savannah complex first found at Irene Mound, Savannah, Georgia.

The site is important as one of several Ogeechee drainage occupations indicative of a transition from prepottery to early pottery sequences in northeast Georgia.

The Semi-Tropical Woodland of Georgia and Similar Climatic Areas

DAVID J. DELAUBENFELS, Geography and Geology, University of Georgia

The pine flats of Southern Georgia continue into Florida, Cuba, and Central America with very little change; thus Georgia shares a vegetation type, in a sense, with the tropics. This condition is not unique, because a similar situation can be found on the margins of the tropics in South America and Australia, while it is to be supposed that the two or three other climatically similar areas of the world also display the same prenomenon. The South Georgia pine flats are, basically a semi-arid tropical woodland that, for reasons of climate and soil, must withstand dry conditions. Its plants are, in fact, admirably suited to survive periods of drought, which enables them, incidentally, to endure freezing temperatures as well. Thus these tropical woodlands are not limited in their distribution by occasional un-tropical temperatures as is the tropical rainforest.

35mm slides

Use of the Circle as an Incorporated Place Boundary

HOWARD A. SCHRETTER, Geography and Geology, University of Georgia

It is a well established fact in law that the geographic limits or boundaries of incorporated places must be definite and certain. The necessity of such boundary formulization is obvious when one considers that the leading object of incorporation is to invest the inhabitants of a defined locality with a corporate existence and concomitantly, municipal jurisdiction. While the law is concise regarding the necessity of establishing such limits, there are no general policies concerning the nature of incorporated boundaries, i.e., size and shape. These, to a great extent, are influenced by uncontrolable variables, population density, distribution and anticipated growth trends, areal situation, and, of course, political vagaries. Thus, in general there is little in the way of consistency of town size and shape in the United States.

However, here in the Southeast we find a surprising number of circular incorporated places, more than 600 in number. Distributed from Virginia through North Carolina, South Carolina and, Georgia to Alabama, such towns are primarily concentrated on the Inner Coastal Plain and Upper Piedmont of South Carolina and Georgia, with over 60% of all circular towns located in the latter state. Research now in progress is leading to the conclusion that the use of the circle as a town boundary in the United States is of Southeastern origin and that the phenomenon is primarily concentrated in that area.

Mineral changes produced by weathering a feldspathic amphibolite gneiss from DeKalb County, Georgia

WILLARD H. GRANT, Emory University

The fresh rock is gneissic with black hornblende and white plagioclase. The composition is principally hornblende and plagioclase (An50) with smaller amounts of diopside, quartz, magnetite epidote and titanite.

The transition zone between the fresh rock and the saprolite is narrow, usually 2 or 3 mm. Within this zone all mineral changes take place. The order of ease of mineral alteration is as follows: plagioclase, followed very closely by diopside, epidote, and hornblende. Quartz and magnetite resist alteration.

The porous saprolite is ochre-colored and faithfully preserves such structures as joints and foliation. Mineralogically, it is composed of halloysite (N=1.56), limonite, a scattering of black streaks and blebs of wad and magnetite and quartz. The texture is a reticulate mass of halloysite pseudomorphing both rock texture and sometimes minerals. The halloysite "framework" has a coating of limonite. Here and there narrow vein-like bodies of nearly white halloysite (N=1:56) about 1mm thick, cut the foliation at various angles. Also scattered blebs of nearly white halloysite (N=1.53) occur. X-Ray diffraction studies indicate that the bleb halloysite is better crystallized than the other two.

As the soil is approached the porous reticulate structure of the saprolite disappears. It is apparently filled by flocculant hydrous iron oxides. Magnetite and quartz still persist.

Heavy Minerals in the Miocene Hawthorn of the Cochran, Georgia (15') Quadrangle

S. ROGER KIRKPATRICK, Emory University

The investigation concerns the analysis and interpretation of sand samples taken from the Hawthorn formation in this section of the coastal plain. The information compiled includes the gross percent of heavy minerals, the distribution of zones of concentration, the possible mode of concentration, the major minerals, and the possible economic aspects of the minerals.

A Study of Sedimentation in a Cartersville Slime Pond

EUGENE C. PERRY, JR., Emory University

The slime pond studied is located on the property of the New Riverside Barite and Ochre Company. Pond sediments are derived from a log washer which separates barite from residuum of the Shady Dolomite formation. Depositional features and the relation between particle size and distance from the stream mouth are studied.

Observations on Cross Laminations in Some Pennsylvanian Outcrops in Northwest Georgia

MARCUS B. MOREHEAD, Emory University

Cross laminations are produced only in granular sediments, and are the result of current action, due to wind or water, and rarely to wave action. The Bonair member of the Pennsylvanian sediments of N. W. Georgia has good examples of foreset bedding of the compound truncated type, of the simple foreset type, and of the tabular foreset type.

Investigations include outcrops on Lookout Mt. in Chattooga County, Little Sand Mt. in Chattooga County, and Rock Mt. in Floyd County. The outcrops in the latter two areas may or may not belong to the Bonair member, but present indications seem to so infer. Dips and strikes of the individual laminations of the several outcrops were taken and plotted on an equal area net. The indicated source area for the sediments were to the north.

Section IV

PHYSICS, MATHEMATICS, AND ENGINEERING

101 Geology Building – 9:00 A.M.

Dewey Cooper, Presiding

1. Two New Geometry Propositions Demonstrated. J. F. Duggar, Jr.
2. Study of Forward Scatter Radio Propagation at Georgia Tech. J. B. Berry, Jr. Introduced by M. L. Meeks.
3. Transmission of Light Through Light Guides. Frank A. Sewell, Jr. and R. H. Rohrer, Emory University.
4. Theory of Anharmonic Corrections to Vibrational Frequencies of Chloromethane. J. Neal Huffaker, Emory University. Introduced by J. W. Simmons.
5. Electrical Polarization of Soil Samples. Raymond Hunter, University of Georgia. Introduced by J. H. Henkel.
6. Cadmium Sulfide as a Radiation Detector. Bernard Diesen, Georgia Institute of Technology. Introduced by J. H. Howey.
7. Response of a Cadmium Sulfide Photocell to X-Rays. Bruce L. Blanks, Emory University. Introduced by R. H. Rohrer.
8. The Decay of Nuclei by the Capture of Orbital Electrons from the L Shell. A. L. Stanford, Georgia Institute of Technology. Introduced by C. H. Braden.
9. Measurements of Angular Correlations between a Beta Particle and a Gamma Ray. Harry Dulaney, Georgia Institute of Technology. Introduced by C. H. Braden.
10. An Experiment to Measure the Polarization of Beta Particles. Nisbet Kendrick, Georgia Institute of Technology.

New Geometry Propositions Demonstrated

J. F. DUGGAR, JR., Atlanta, Ga.

If a line is drawn from the vertex of any triangle to intersect the base so that it makes with the base an angle equal to the vertical angle of the triangle, the side of the triangle opposite to this angle is a mean proporional between the base of the original triangle and the segment of the base adjacent to this side.

A second proposition, which was too long to print in the abstract, will be presented.

Study of Forward Scatter Radio Propagation at Georgia Tech

J. B. BERRY, JR. Introduced by M. L. Meeks

Georgia Tech operates two field receiving stations for the Air Force Cambridge Research Center to study forward-scatter radio propagation in the very-high-frequency range. The receiving field sites are located near Atlanta, Georgia and Columbia, South Carolina. The transmitters are located near Boston, Massachusetts and Knoxville, Tennessee.

The received signal is propagated by three primary scattering mechanisms: tropospheric turbulence, a persistent weakly ionized "E" region, and ionized columns caused by meteors. Recent theoretical and experimental research has concentrated on the signals reflected from meteor trails.

The number of meteor-scatter signals received per minute over a forward-scatter link depends on the distribution of directions from which the meteor particles come. The meteor-signal rate can therefore be analyzed to determine something about the meteor radiant distribution.

An important application of meteor scatter is in communication. For communicating via meteor trails it becomes important to know how frequently the signals will come and which direction to point the antennas for maximum effectiveness. Various factors influence these considerations such as earth rotation, geometry of the region of maximum ionization, and concentration of particles in space.

Transmission of Light Through Light Guides

FRANK A. SEWELL, JR. and R. H. ROHRER, Department of Psysics, Emory University

In detecting and measuring radiation by scintillation methods, it is sometimes necessary to transmit light from a crystal to a photomultiplier through some distance. A medium used for this purpose should have low fluorescent and absorptive properties. Work has been done, primarily with lucite pipes, to determine under what conditions light can best be transmitted and to what extent fluorescence occurs. The experimental results will be discussed.

Theory of Anharmonic Corrections to Vibrational Frequencies of Chloromethane

J. NEAL HUFFAKER, Department of Physics, Emory University.
Introduced by J. W. Simmons

A normal coordinate treatment of chloromethane and deuterated chloromethane is carried out and the transformation matrices between normal coordinates and internal coordinates are obtained. By the assumption of bonding as in diatomic molecules, cubic and quartic anharmonicity coefficients are determined for each type of bond from known molecular constants and for several different diatomic potential energy functions. Anharmonicity is carried from internal to normal coordinates by means of the transformation matrices and energy corrections are calculated by second-order perturbation theory. Accuracy of the method is examined and comparison of the different potential energy functions is obtained by use of the Redlich-Teller product rule.

Electrical Polarization of Soil Samples

RAYMOND HUNTER, Department of Physics, University of Georgia
Introduced by J. H. Henkel

Samples of soil, uniform in shape and size, were saturated with solutions of NaCl. They were then subjected to square current pulses, alternately positive, zero, and negative. When the current was zero, the residual potential (induced polarization) was measured. The experimental relations between polarization and permittivity, resistivity, and formation factors were then determined.

Cadmium Sulfide as a Radiation Detector

BERNARD DISEN*—Introduced by J. H. Howey

This report is an extension of a project initiated in Miami, Florida as an entry in a science fair. A cadmium sulfide single crystal is being investigated as a detector of radiation. Several techniques have been used to apply electrical contacts to the cadmium sulfide crystal. Both indium and silver were found to form satisfactory contacts. Measurements of some electrical characteristics of the crystal as a function of the radiation intensity are being made to determine the efficiency of the crystal as a radiation detector. Results of these measurements and an evaluation of the crystal as a radiation detector will be presented.

Response of a Cadmium Sulfide Photocell to X-Rays

BRUCE L. BLANKS, Department of Physics, Emory University
Introduced by R. H. Rohrer

Experiments with commercially available Cadmium Sulfide crystals as an X-ray intensity measuring device are described. Results of these

*Mr. Bernard Diesen is a third quarter freshman at Georgia Tech.

tests indicate that CdS is not suitable for accurate intensity measurements, but might be useful as a switching device.

2 x 2 slides

The Decay of Nuclei by the Capture of Orbital Electrons from the L Shell

A. L. STANFORD, Georgia Institute of Technology
Introduced by C. H. Braden

In most cases radioactive nuclei which decay by the capture of orbital electrons do so by the capture of electrons from the K shell. However, in certain instances, determined mainly by energy considerations, orbital electrons may be captured from the L shell. The conditions under which L capture may compete favorably with K capture will be described. The experimental method being used in this laboratory to detect the presence of L capture will be described.

Measurement of Angular Correlations between a Beta Particle and a Gamma Ray

HARRY DULANEY, Georgia Institute of Technology
Introduced by C. H. Braden

Many radioactive nuclei decay by the emission, in rapid succession, of a beta ray and a gamma ray. It is of interest to determine if the gamma ray is emitted at a preferential angle with respect to the direction in which the beta ray was emitted, i. e., to determine if a beta-gamma angular correlation exists. The experimental procedure in use at this laboratory to investigate angular correlations in nuclear decays will be described.

An Experiment to Measure the Polarization of Beta Particles

NISBET KENDRICK, Georgia Institute of Technology

The recent discovery of non-conservation of parity by Yang and Lee indicates that beta particles emitted in the decay of many radioactive nuclei should be polarized, i. e., the angular momentum vector representing the intrinsic spin of the electron should be oriented preferentially parallel or anti-parallel to the direction of motion of the beta particle. An experiment to detect the degree of this polarization is being designed. The polarization phenomenon will be further discussed and the proposed experiment will be described.

Section V

PSYCHOLOGY AND MEDICINE

206 Geology Building – 9:00 A.M.

Miss Mary Schumpert, Presiding

9:00 A.M.—

1. A COMPARISON OF CERTAIN SEX DIFFERENCES RELATED TO SCHOOL DISCIPLINE AND MORALE AMONG WHITE AND NEGRO HIGH SCHOOL STUDENTS. James E. Greene, Sr., Ph.D., Department of Education, University of Georgia, Athens.

9:15 A.M.—

2. ADRENAL GLYCOGEN CONCENTRATION IN NORMAL, HYPOPHYSECTOMIZED AND PYRIDOXINE-DEFICIENT WHITE RATS. Ruth Bastin Slentz, M.S., Wesleyan College, Macon, and Evangeline T. Papageorge, Ph.D., Emory University.

9:30 A.M.—

3. STUDIES OF COMPOSITION AND PRESSURE OF DENTAL PULP FLUID WITHIN THE PULP CHAMBER. John Haldi, Ph.D.; Winfrey Wynn, M.S., and George Steelmon, A.B., Department of Physiology, Emory University.

9:45 A.M.—

4. CONVENIENT COLORIMETRIC METHODS FOR ESTIMATION OF SERUM LIPIDS IN ATHEROSCLEROSIS. Virginia S. Whitner, M.S.; J. Gordon Barrow, M.D.; Carroll B. Quinlan, M.D.; and Gerald R. Cooper, Ph.D., M.D., Heart Disease Control Program, Georgia Department of Public Health, Department of Medicine, Emory University School of Medicine, Grady Memorial Hospital, and Communicable Disease Center, U. S. Public Health Service, U. S. Department of Health, Education and Welfare.

10:00 A.M.—

5. FACTORS AFFECTING FILTER PAPER ELECTROPHORESIS ANALYSIS. Phyllis L. Strobel, M.S.; Janet E. Fetner, B.S., and Gerald R. Cooper, Ph.D., M.D., Hematology and Biochemistry Section, Communicable Disease Center, U. S. Public Health Service, Atlanta.

10:15 A.M.—

6. HYPOGAMMAGLOBULINEMIA IN GEORGIA. Gerald R. Cooper, Ph.D., M.D., Hematology and Biochemistry Section, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education and Welfare, Atlanta; Department of Medicine, Emory University School of Medicine, Emory University, and Grady Memorial Hospital, Atlanta.

ABSTRACTS

A Comparison of Certain Sex Differences Related to School Discipline and Morale Among White and Negro High School Students

JAMES E. GREENE SR., Ph.D., Department of Education, University of Georgia

The Problem. The present paper is the fifth in a series dealing with various significant aspects of school discipline and morale among white and Negro high school students and teachers. Specifically, the present study deals with the hypothesis that no significant sex differences exist in the disciplinary status and morale of white and Negro high school students in a large Southeastern School System.

The Research Design. Several measures of "disciplinary status" and "morale" were obtained on a representative sample of white and Negro high school students. Conventional tests of statistical significance were applied to all sex comparisons made.

The Findings. In many of the inter-sex comparisons in both racial groups, the null hypothesis was retained. In instances in which the null hypothesis is rejected, brief comments are made concerning the implication of the findings.

Adrenal Glycogen Concentration in Normal, Hypophysectomized, and Pyridoxine-Deficient White Rats

RUTH BASTIN SLENTZ, M.S., and EVANGELINE T. PAPAGEORGE, Ph.D., Wesleyan College, Macon, and Emory University

Adrenal glycogen was determined in normal male and female rats of different ages, in hypophysectomized rats, and in pyridoxine-deficient

rats. Glycogen was assayed colorimetrically with anthrone, after isolation by a modified Pflueger technic. Non-fasted males, 56 to 85 days of age, had an adrenal glycogen concentration of 124.4±6.6 mg per 100 gm of fresh tissue, while 24-hour-fasted rats of the same age had a value of 197.8±8.6 mg%.

Female rats, 56 to 85 days of age, had 45.9±3.3 mg% of adrenal glycogen in the non-fasted state, and 74.8±5.2 mg% after fasting. Other females also exhibited consistently lower concentrations than males of comparable age and nutritional state. While very young female rats had a higher level than older females, the reverse was true in males. In all groups of both sexes, lower adrenal glycogen concentrations occurred in the non-fasted animals than in those deprived of food for 24 hours.

The adrenal glycogen concentration of hypophysectomized males was relatively unaffected by age or by ingestion of food. Pyriodoxine deficiency tended to decrease sex differences, and to lessen changes that occur with normal growth, particularly in the female.

The findings support the hypothesis that adrenal glycogen concentration is related to adrenocortical activity. Lower levels are apparently associated with stimulation of the cortex.

3¼ x 4 slides.

Studies of Composition and Pressure of Dental Pulp Fluid within the Pulp Chamber

JOHN HALDI, Ph.D., WINFREY WYNN, M.S., and GEORGE STEELMON, A.B., Department of Physiology, Emory University

A method has been found by which fluid may be collected from the pulp chamber of the dog tooth for microchemical analysis and by which the pressure exerted by this fluid within the chamber may be measured. A hole was introduced through the hard structures of the tooth to the pulp chamber and a small polyethylene tube having an inside diameter of 0.045 mm was inserted and cemented to place. The ultrasonic technique was used in the preparation of the hole since this allows one to approach the soft tissue of the pulp without damaging the vascular supply. Within twenty to forty minutes after the tube was inserted a clear colorless fluid rose in it to a height of about 20 mm. Microscopic examination of the fluid revealed the absence of erythrocytes indicating that no bleeding had occurred. Other experiments were done in which a drop of the fluid was burned to the Bausch and Lomb spectrograph and the cations compared to those of the animals plasma which was handled in a similar fashion. In other experiments the tube was placed in connection with a small tambour arranged to scribe a moving kymograph paper. The arc described by the moving point was calibrated in millimeters of water pressure. The pressure of the fluid was found to be about 15-20 mm of water. Upon severing the vagi the resultant rise in the systematic blood pressure was followed promptly by a rise in the pressure of the dental fluid.

2 x 2 slides.

Convenient Colorimetric Methods for Estimation of Serum Lipids in Atherosclerosis

VIRGINIA S. WHITNER, M.S.; J. GORDON BARROW, M.D.; CARROLL B. QUINLAN, M.D., and GERALD R. COOPER, M.D.

Heart Disease Control Program, Georgia Department of Public Health, Department of Medicine, Emory University School of Medicine, Grady Memorial Hospital, and Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare.

The diagnosis of atherosclerosis and other clinical states concerned with lipid metabolism needs a system of lipid analysis which can be

performed conveniently on small quantities of serum. The following scheme is suggested for this purpose. The lipids are extracted from one milliliter of fresh serum with alcohol-ether. On aliquots of this extract colorimetric determinations are made for total esterified fatty acids, phospholipids, total cholesterol, and free cholesterol. Values for esterified cholesterol and triglycerides are obtained by calculations. Each determination is carried out in duplicate cuvettes and read on the Coleman Jr. spectrophotometer. With this scheme of analysis any clinical chemistry laboratory can estimate with relative ease and reliability the lipid fractions of serum. This technique has proved useful in characterizing serum lipids of normal and atherosclerotic individuals.

3¼ x 4 slides.

Factors Affecting Filter Paper Electrophoresis Analysis

PHYLLIS L. STROBEL, M.S., JANET E. FETNER, B.S., and GERALD R. COOPER, Ph.D., M.D., Hematology and Biochemistry Section, Communicable Disease Center, U.S.P.H.S., Atlanta

Wide variations in quantitative paper electrophoresis results have been obtained by laboratories using different instruments and techniques. A study has been made on the precision and accuracy of a quantitative paper electrophoresis method using a simple vertical apparatus and an elution procedure. It has been found that results obtained by this method could be affected by the following factors: (1) length of the pattern, (2) choice of the buffer medium, (3) temperature and duration of the heat fixation, (4) pH of the dyeing solution. The degree of heat denaturation and the pH of the staining solution affect the dye-combining capacity of the proteins. The temperature causing the minimum increase in dye-binding capacity of the albumin fraction during the heat fixation on the filter paper, has been found to be between 100 and 120° C. Maximum dye-binding by all of the serum proteins was accomplished in a brom-phenol blue staining solution above pH 3.5.

Reproducibility in paper electrophoresis is improved by carefully controlling the conditions of the fixation, staining, and elution techniques.

3¼ x 4 slides.

Hypogammaglobulinemia in Georgia

GERALD R. COOPER, Ph.D., M.D.

From the Hematology and Biochemistry Section, the Communicable Disease Center, P.H.S., U. S. Department of Health, Education, and Welfare, Department of Medicine, Emory University School of Medicine and Grady Memorial Hospital, Atlanta.

A deficiency of gamma globulin has been reported in certain patients with a history of recurrent severe infections. This state of poor resistance to infections arises congenitally or is acquired from an insult apparently to the reticuloendothelial system. Diagnosis of infectious diseases by serologic techniques and efforts toward immunization are affected adversely in these patients. Results of an investigation upon approximately 400 patients with a history of high susceptibility to infections reveal that about 20 per cent of these individuals can be classed in the hypogammaglobulinemia state. Conclusion is made that gamma globulin is only one of many factors involved in host resistance.

3¼ x 4 slides.

Section VI

PHILOSOPHY AND HISTORY OF SCIENCE

7 Geology Building – 9:00 A.M.

Leon Hardy, Presiding

Scientific Academies and the Cultural Impact of Science

L. E. LOEMKER, Emory University

The academies of the seventeenth century are examined briefly in terms of their scope and aims, with particular reference to their relations to the "Republic of Letters" and to the beauty of religion and culture.

It is suggested that our failure in the United States to adopt the institution of the academy of sciences has contributed to the greater isolation from each other of the several sciences and arts and to our technological emphasis in science, to the impoverishment of our public life and culture.

A Critique of Operationalism

JAMES A. GOULD, Emory University

The most talked about theory of scientists concepts today is operationalism as stated by the physicist Bridgman. Scientists usually are not aware that this is a "young man's" theory and consequently is rather immature. Not only is the general thesis inadequate but the concept "operation" itself has not been defined.

Time, Science and History

STANLEY DAUGERT, Oglethorpe University

The view of time forced upon us by modern science, and the nearly identical view of time forced upon us by the mythologizing imagination give us a radically new perspective of history—one that impels us to see all events as contemporaneous or, if not contemporaneous, then instantaneous. It will be maintained that a view of this kind is at least as serviceable for history as the usual serial view of time.

Some Aspects of Science in the Late 17th and Early 18th Centuries

GEORGE E. PHILBROOK, Chemistry Department,
University of Georgia, Athens

A survey of the Memoires and Histoires of the Royal Academy of Science (Paris) for the period 1661 to 1775 reveals that, particularly in the later part of this period, a great deal of quantitative work was being reported. This is in contradiction to the impression usually given in biographical reports on Lavoisier that he was primarily responsible for the introduction of quantitative methods in science and particularly in chemistry.

The development of quantitative techniques resulted, in large part, from the interest of the French government in the loss of silver in the coinage process and in the uncertainties encountered in the assay of silver and gold.

During the same period, quantitative astronomy and quantitative thermometry were developing rapidly and respect for this work was widespread among scientific thinkers of the period.

It seems probable that Lavoisier should properly be regarded not so much as the originator of quantitative techniques, but more as one who made the final and extremely important steps in the refinement of their application.

Some Explanation for Disagreements About a Definition of Science

RUBIN GOTESKY, University of Georgia

Philosophers of science and scientists disagree rather widely about the meaning, purpose, and nature of science. There are at least four reasons for this. These regions are discussed in detail. Some additional comments are made about the causes for disagreements in the social sciences.

The Intelligibility of Nature in Locke and Newton

J. J. JOHNSON, Georgia State College

This paper briefly analyzes the epistemological relations between Locke and Newton, special attention being paid to Locke's failure to share Newton's faith in the intelligibility of things. The cognitive status of scientific generalizations in the two thinkers is examined and some of the differences between a philosophic and a scientific treatment of epistemological issues is discussed.

Section VII

SCIENCE EDUCATION

Saturday, April 26, 1958

9:00 A.M. to 3:30 P.M.

Field Trip to Granite Outcrops (Mount Arabia in Rockdale County and Stone Mountain in DeKalb County)

This trip constitutes the program for the annual meeting of Section VII. It is jointly sponsored by the sections of Biology, Geology and Science Education. The leaders from the Biology section will be Dr. Robert B. Platt, Dr. W. B. Baker, Mrs. Netta Gray, Dr. Chas. W. Ray and Mr. Allen Rebuck. Graduate students from the Biology Department at Emory who will act as leaders are David D. Cotter, William C. Lammers and Robert A. Pedigo. The leaders from the Geology Section will be Mr. R. J. Martin, Dr. A. S. Furcron ,Dr. Vernon J. Hurst and Dr. J. G. Lester.

The cost of the trip for transportation from the Emory Campus and return, and for lunch, will be $2.00. Registration for the field trip should be mailed, accompanied by payment, to Louise Stakely before April 24th, or registration may be made at the registration desk at Emory until 2:30 P.M. April 25. Lunch cannot be guaranteed for those who join the field trip after 2:30 Friday afternoon.

We will assembly in room 105 Biology Building at 9 A.M. on Saturday morning for a brief business meeting before the leaders give their instructions. The office of secretary and chairman elect is to be filled. Send any suggestion you may have to Laura Sue Hawkins, Griffin High School, Griffin, Georgia, who is Chairman of the Nominating Committee.